tional openings or by substituting culverts of greater width for those originally constructed.

In addition to the flood-water openings, the banks were raised over several miles of the line, principally through the Achimotah Valley, but also near twenty-three miles and over the Pom-Pom swamp, which is above N'Sawam.

The whole of the above work, including the addition of the bridges and the raising of the banks, was done without interruption of the daily traffic.

It will be readily understood that the successful carrying out of such an undertaking as the building of a railway in West Africa largely depended upon the perfect organization at home, as the mail boats take seventeen days in the passage from England, and the cargo boats five weeks. One large ship, containing a supply of coal for the engines, was wrecked on the coast, and the work would have been much hampered if there had not been a reserve supply on hand. Another cargo ship, containing some materials for the railway, was lost with all hands and never heard of. Everything that may be conceivably wanted has to be sent with a margin to spare, and well in advance of requirements. Great precision and a highly-organized system directed from home is an absolute necessity to prevent the work from coming periodically to a standstill. Everything required for railway track and station building construction, and for housing provisioning, and furnishing for the staff had to be anticipated and sent out in advance, so as to be available when required.

Bungalows for the officers and quarters for the men and a fully-equipped hospital building were sent out in sections ready for erection.

The rolling stock for the construction consisted of two 6-wheeled locomotives (duplicates) with outside cylinders, 12-inch diameter, 18-inch stroke, 6 wheels coupled 3 feet 1 inch diameter, gauge 3 feet 6 inches, fire-box of best selected copper with brass tubes, 84 in number, 2-inch diameter, with 2 special hot water injectors, side tanks, holding 470 gallons of water; wheel base 8 feet 6 inches; weight, loaded, about 24 tons.

One with 9-inch cylinders, 15-inch stroke, 4 wheels coupled, 30½ inches diameter, gauge 3 feet 6 inches, fire-boxes of copper with brass tubes, 50 in number, 2 inches diameter, 2 sirlus type injectors, saddle tank, holding 300 gallons of water, wheel base 5 feet, weight, loaded, 12½ tons.

The government provided the permanent rolling stock. This includes licomotives, weight 50 tons, covered-in carriages, with both first- and second-class, fitted with lavatories, also brake-vans for the guards. For the passenger traffic a very comfortable corridor train can be made up with this rolling stock.

For the goods traffic both open and closed trucks are provided. These are of steel construction. Hand-brakes are fitted on each carriage and truck. These can be operated from one of the platforms at the end of the carriages, and in the case of the trucks, both open and closed, either the hand-brakes or the couplings can be attended to when standing on a small platform which is hung on buckets at a height of about 12 inches above the rail.

Only European engine drivers and guards are allowed with the regular goods and passenger traffic. Mostly native drivers attended to the ballast and material trains while the line was being constructed and before it was opened to public traffic.

A five-chain curve was put in at the junction of the main line and the harbor branch, so arranged as to complete a third side of a triangle. This provides a means for turning an engine or the whole train if desired.

All the engines take water at Accra, which is taken from the well. When water is scarce the well is kept continually pumped to get the best supply, and the large underground tank is kept filled. Both are drawn from when the demand is heavy; when not heavy the underground tank is filled up.

During the dry season of 1911 there was always enough fresh water from this source for the railway requirements, and frequently there was some to spare for the harbor works where they were at times very badly off, and were obliged to get fresh water brought from N'Sawam by rail.

There is a good supply of fresh water at N'Sawam, which is on the Densu River, and also a fair supply at Ensake Swamp, 13 miles. At these two places there are tanks fitted for watering the engines.

The joint consulting engineers for the line are Messrs. R. Elliott Cooper and Frederick Shelford, of London. The resident engineer is Mr. Douglas Grey. Mr. Arthur J. Salter represents Mr. Muphy on the Gold Coast, and Mr. T. E. Etlinger is his chief engineer.

REPORT ON HAMILTON SEWAGE DISPOSAL WORKS.

A report was made recently on the sedimentation tank, which is located in the north-east corner of the city of Hamilton, by Dr. John Amyot, Provincial Bacteriologist. Dr. Amyot visited the plant in the early part of November, and on November 23rd made his report to Dr. McCullough, Secretary of the Provincial Board of Health. The following is the text of the report:—

As a sedimentation basin, which was intended for a septic tank, it is too small for the purpose. It was reported to me that the sludge had never been removed from it, thus its capacity is much reduced over what was first intended. There are no means provided for handling the sludge if they desired to handle it.

According to the engineer, the hydraulic head provided for the carrying of the effluent from this tank to the sprinkler filters is not sufficient to reach the lower end of these beds. The beds themselves are built of very irregular material as to size and quality, much of which is crumbled by weathering, and possibly by the action of the sewage sprinkled upon them. The greater bulk of it is in good condition if it were properly sorted and could be made use of.

There is no foundation to the beds; the slag has been thrown right on the clay, thus making one of the most serious mistakes in its construction. Such beds, in order to work efficiently, must have a straight-away, unimpeded flow of drainage.

On account of the diminished sedimentation and the presence of iron waste in the sewage, heavy deposit of hydrate of iron and clay has taken place over practically the whole surface of the beds, thus sludging them completely and preventing them being put to the use they ought to be. If the sedimentation tank had been efficient, most of the iron would have precipitated in the tanks and not gone on to the beds and destroyed them.

I also found a lack of appreciation of the principles of sewage disposal in reference to these beds, and would in consequence advise as strongly as possible that a sanitary engineer accustomed to this particular type of sewage plant be employed by the city of Hamilton before any alterations are made.

Much of the plant can be used over again but special advice should be received in reference to this.